Equipment Involved in November 20, 1987 VCL Release

1. Waste Water Stripping Column

Rupture Disc

- Size - 2 inch
- Rupture Disc Relieving Pressure - 90 psig at 72°F
- Type - BV
- Date Last Replaced - 8/10/87

Relief Valve

- Size - 2 x 3
- Type - Farris
- Relief Valve Relieving Pressure - 75 psig
- Date last checked and cleaned 8/11/87; 11/23/87

Arrangement: Dual assembly single disc gaydos R/V

2. Waste Water Holding Tank

Rupture Disc

- Size - 4 inch
- Rupture Disc Relieving Pressure - 100 psig at 72°F
- Type - Carbon Disc
- Date Last Replaced - No Record

Arrangement: Dual Assembly Single Disc

3. APRS "Burp" Tank

Rupture Disc

- Size - 4 inch
- Rupture Disc Relieving Pressure - 105 psig at 72°F
- Type - BV
- Date last replaced - West 9/1/85
  East 10/21/86*

* Note - One side is only in service at a time. When the west is blown or a malfunction found in R/D then the east is put in service.

Relief Valve

- Size - 4 x 6
- Type - Farris
- Relief Valve Relieving Pressure - 120 psig
- Date Last Checked and Cleaned 5/29/87

Arrangement: Dual Assembly Single Disc Gaydos R/V

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REASONS THAT CAUSED 11/20/87 RELEASE

1) INTERRUPTION OF cooling water CAUSED BY FAILURE OF APPROXIMATELY 50 EVAPORATOR TUBES IN #2 REFRIGERATION UNIT AND THE INABILITY OF operting the electrically ACCUATED Cooling TOWER Valves

2) Poly #1 Blending Resin Burp Valve lodged open due to exc RESIN CARRYOVER AND REQUIRED VALVE TO BE MANUALLY close.

3) Four Suspension polys also BURPED

THE COMMON AGREEMENT AMONG Bill Lindstrom PVC TECHNICAL GROUP is THAT IF Poly #1 Burp Valve had worked properly THAT A RELEASE WOULD NOT HAVE occured.

REASONING ALOE

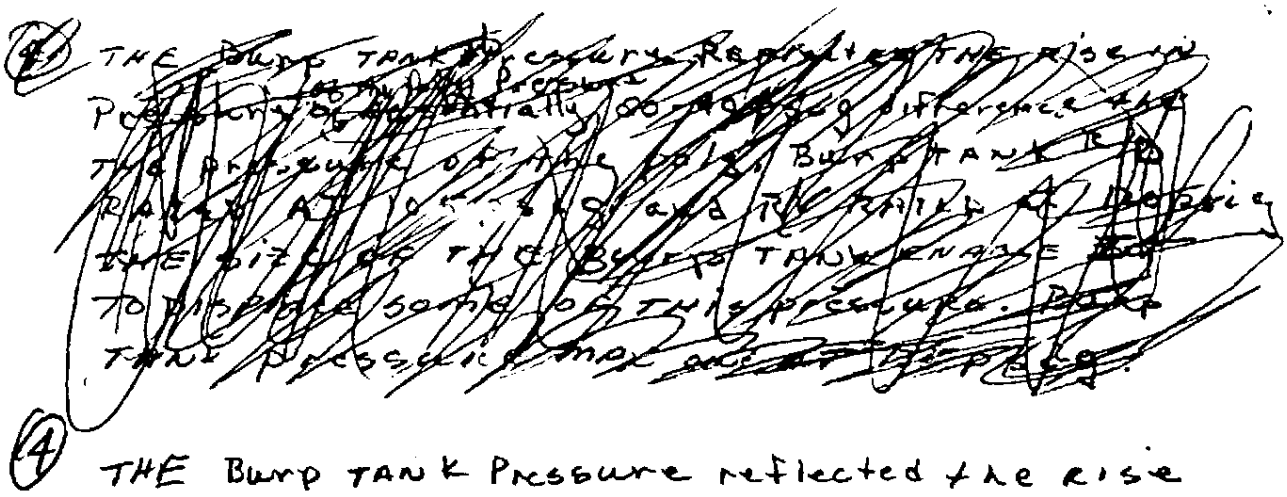
1) GREATER AMOUNT OF Slurry Burp to Burp TANK THEN IF VALVE work Properly.

2) EVEN without cooling water we still had Power to perform some RECovery (very little) on Burp tank

3) Burp TANK Pressure would never had Risen THAT High IF NOT for the ~~AMOUNT~~ Volume of UNREACTED VCM Burp dump to Burp Tank

NGC 01633

OVER



(4) THE Burp TANK Pressure reflected the rise in pressure of Poly #4 when it Burped. The Burp TANK R/D RATED AT 105 psig AND R/V RATED AT 120 psig. THE size OF THE Burp TANK enable IT TO DISPLACE SOME OF ~~THE~~ THIS pressure. Burp TANK pressure MAX out AT 125 psig.

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[redacted]

2WAY VALVE is operate
Accomplished By THE RELIECULATION level INDICATOR IN LINE 1
THE Burp TANK is designed TO FEED by Head pressure AND/or TANK pressure (2psig), ONCE THE Level INDICATOR/TRANSmitter SENSES A level of 30%, THE TRANSmitter send A signal to A control VALVE which opens. THE MATERIAL FLOWS TO THE Burp TANK Bottoms pump where it is Pump to A 2WAY VALVE. THE MATERIAL may either Be RECIRCULATED BACK TO Burp TANK OR FED TO THE WWS Colm FEED pump. Feed Control VALVE set AT 30gal, 40
MATERIALS BEFORE ENTERING stripping Colm is MIX with steam IN A hydroheater. GAS ARE pulled off THE Top OF THE Colm. AND stripped liquid FALLS TO THE Bottom
HE liquids. EITHER DUMP TO THE SEWER OR RECIRCULATE BACK TO THE WWS HOLDING TANK. THIS Accomp By A control VALVE which IS ACCUATED By A Level transmitter/INDICATOR IN THE HOLD TANK

HOW EACH VESSELS PRESSURE BECAME GREAT ENOUGH TO BLOW R/D,

Burp TANK — PRESSURE BECAME GREAT ENOUGH DUE TO THE LARGE VOLUME OF UNREACTED Vinyl Burp TO THE TANK.

NGC 01635

WWS HOLDING TANK — DUE TO THE EXCESSIVELY HIGH PRESSURE OF THE Burp TANK and THE FACT THAT THE FEED control VALVE will only ALLOW A MAXIMUM RATE OF 30 gal/min THE BLOWDOWN WAS ABLE TO BACK UP TO

BFGoodrich

WWS Holding TANK – DUE TO THE EXCESSIVELY High Pressure OF THE BURP TANK AND THE FACT THAT THE FEED Control valve will only Allow A FEED RATE OF 30-40 gal /min, THE slurry BACK-up THROUGH THE WWS Holding TANK Dump LINE INTO THE TANK. THE UNREACTED VCM contacted THE TANK'S "WATER" operating parameter (210°F) (1 psig) AND IMMEDIATELY FLASH OFF CREATI EXCESSIVE pressure, WWS HOLDING TANK R/D RATED AT 100 psig (CARBON DISC).

WWS Colm. – THE STEAM FEED TO WWS Colm. WAS NOT VALVED OFF Although this possibly would NOT HAVE PREVENTED THE Colms R/D (90 psig RATING) FROM Blowing DUE TO THE High Temperature THAT THE Colm. operates (220°F & 1 psig).

Burp TANK Valve Lodging open.

THIS incident happened on one occasion TO A poly BUT DID NOT RESULT IN ANY RELEASE DUE TO SOMEONE Recognizing the SITUATION (less MATERIAL Dump TO B. TANK) THIS DID prompt A CORRECTIVE ACTION. IT WAS To INSTALL A solenoid switch which could Be operated By A poly operator TO INSURE THAT THE Burp Valve will Accurate open and Close. THIS IS DONE ON Every poly THAT IS TO BE charged EITHER BEFORE Charging or During Recovery OF THE previous poly.

BFG-1129-B 1/77

over

PRINTED IN U.S.

NGC 01636

THERE is A POSSIBILITY THAT DURING A CHARGE
Polymer [redacted] Build up could Be so dramATic
THAT IT COULD CAUSE THE VALVE TO Stick open.

BFGoodrich

where you see the ARROWS

Possibly include this to show improve communicat between CILCO and [redacted] Henry Plant. or mention it when Presenting meeting.

— The Plant experience a momentary Pow dip on January 22. We made contact with CILCO after the incident. They indicated that they had planned on contacting us once information was gathered to determine the cause, they experience no warning sign so they were unable to notify [redacted] the Plant ~~Plant~~ in advance.

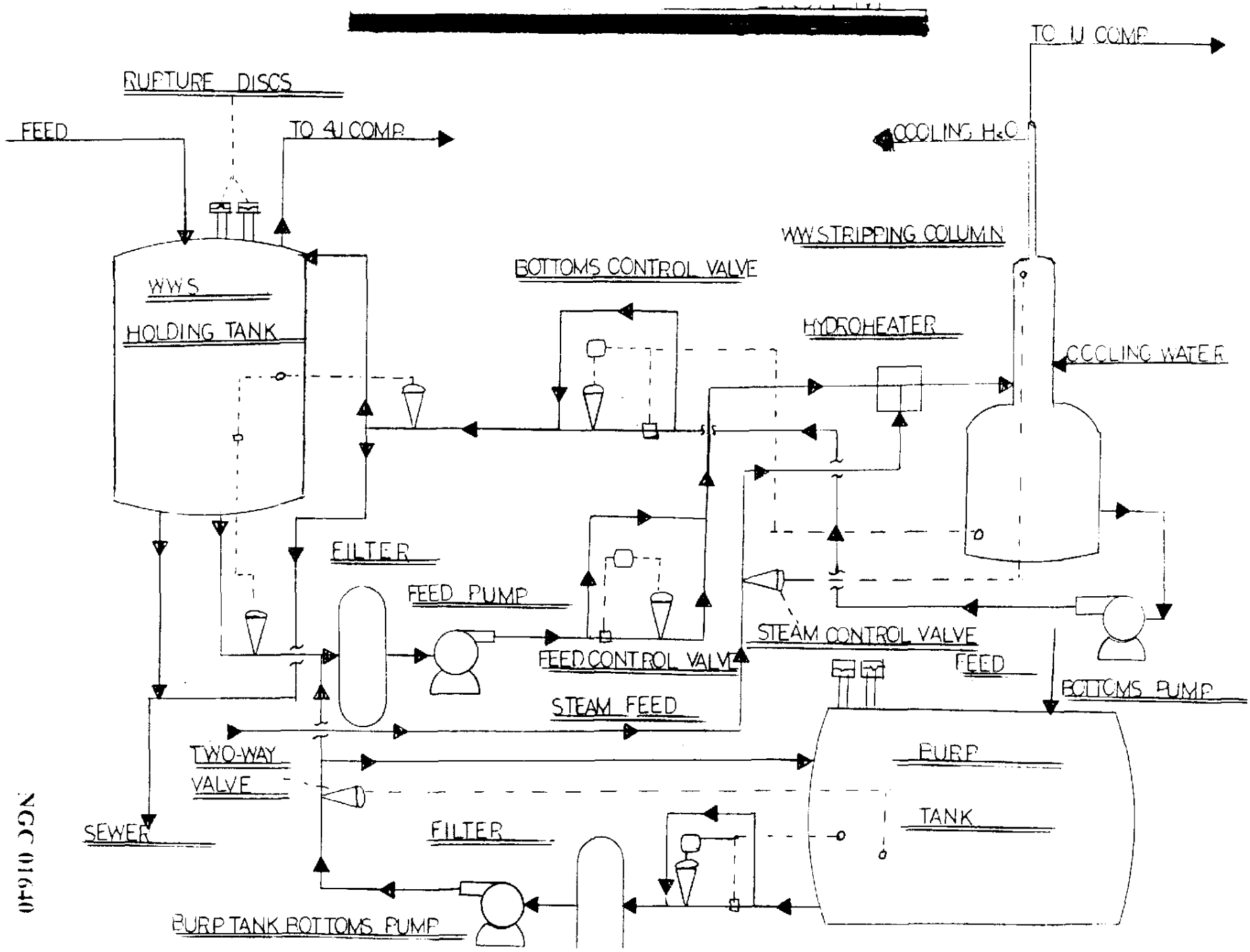
On January 27 we received a phone call from CILCO notifying us that they ~~were going to~~ had planned to work on the Sub Station some time, January 28. The following day CILCO confirmed the time at which they would be taking one loop out of service.

Plant shut down coordinated with CILCO

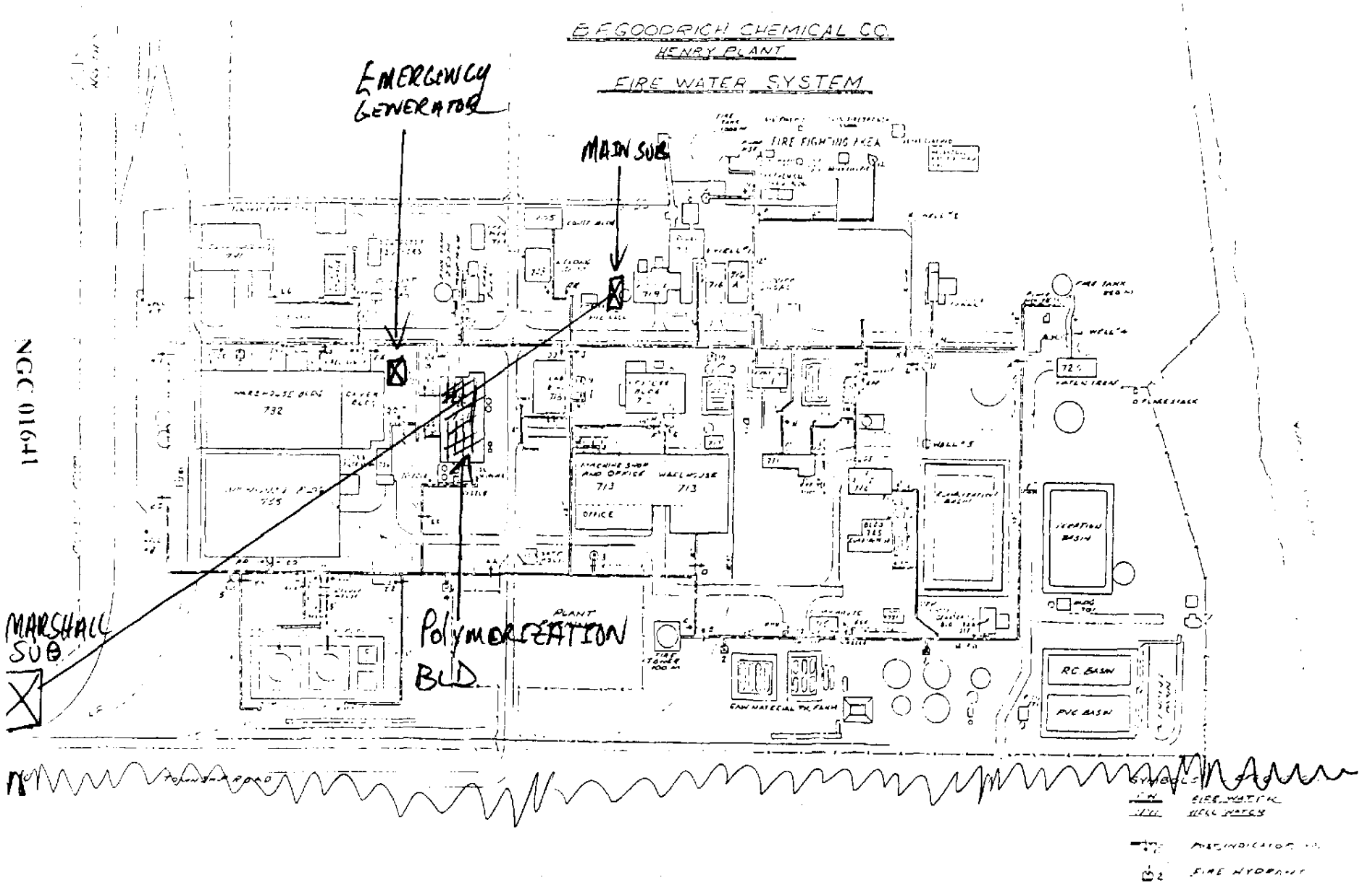
NOVEMBER 20, 1987 WWSC, WWHT, AND BURP TANK

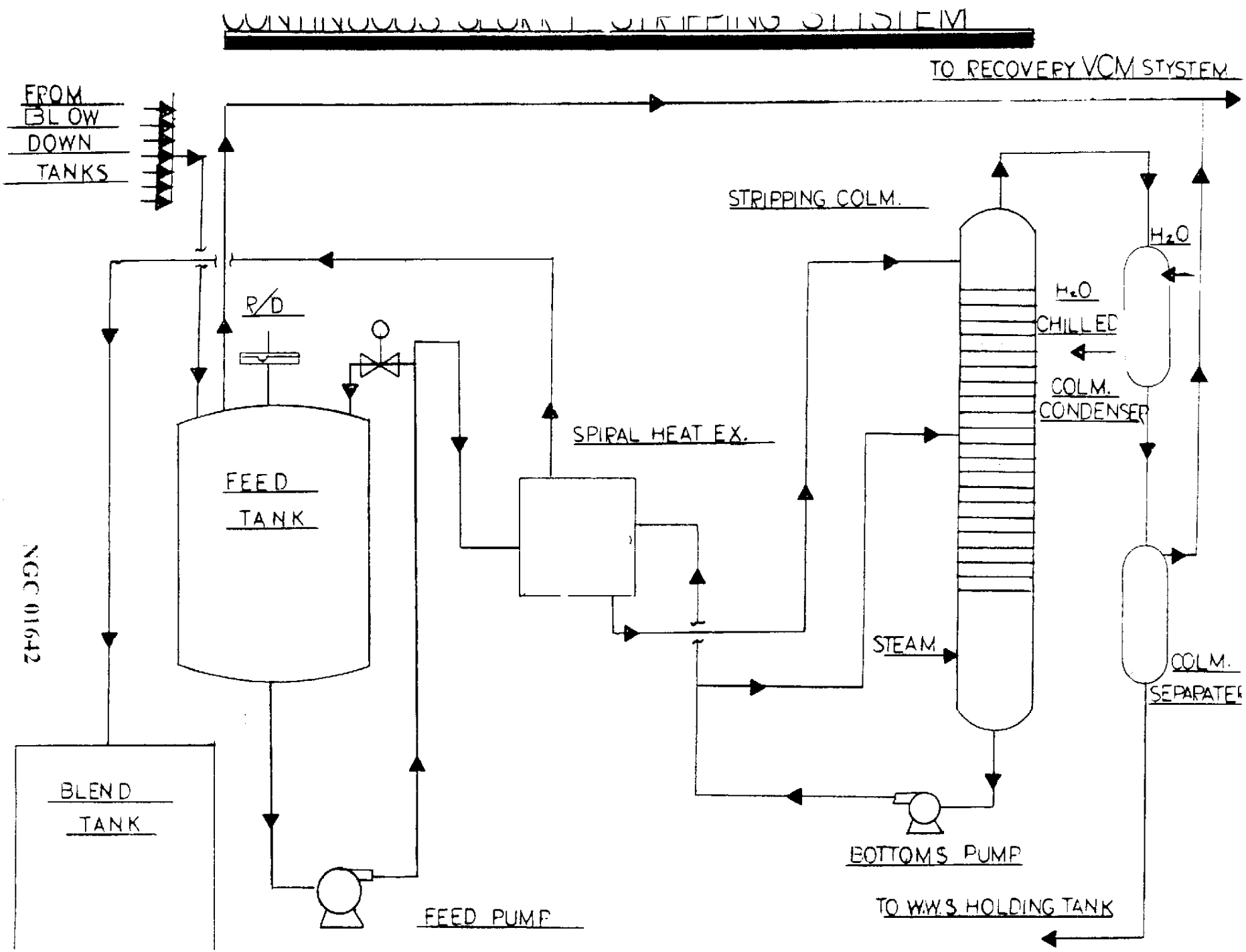
CORRECTIVE ACTION	STATUS
1. The incident will be reviewed with all operational personnel in the Polymerization Area, and all emergency steps involving cooling water failure will be reviewed.	Complete
*2. Install a pressure switch to actuate closed all burp valves at Burp Tank pressure of 90 psig or in an event of a power outage.	Complete
3. The steam supply to the wastewater stripping column will be reviewed and modified to provide an automatic shutoff when a high pressure condition is determined in the stripper.	Complete
4. A review of the feed system to the waste water stripper and hold tank is to be done. The modification recommended from this review will be implemented to prevent over pressuring the system.	Complete
5. The cooling water supply system will be reviewed and modifications will be made to ensure that the back-up cooling water supply can be actuated.	Complete
*6. Change present burp tank R/D to 120 psig/90%/120°F	Complete
*7. A pressure switch will be installed on the two way burp tank valve (drain/recirculation) which will fail to recirculation side based on hold tank pressure of 13 psig.	Complete

*Denotes corrective actions not reported to agency in ten day report.

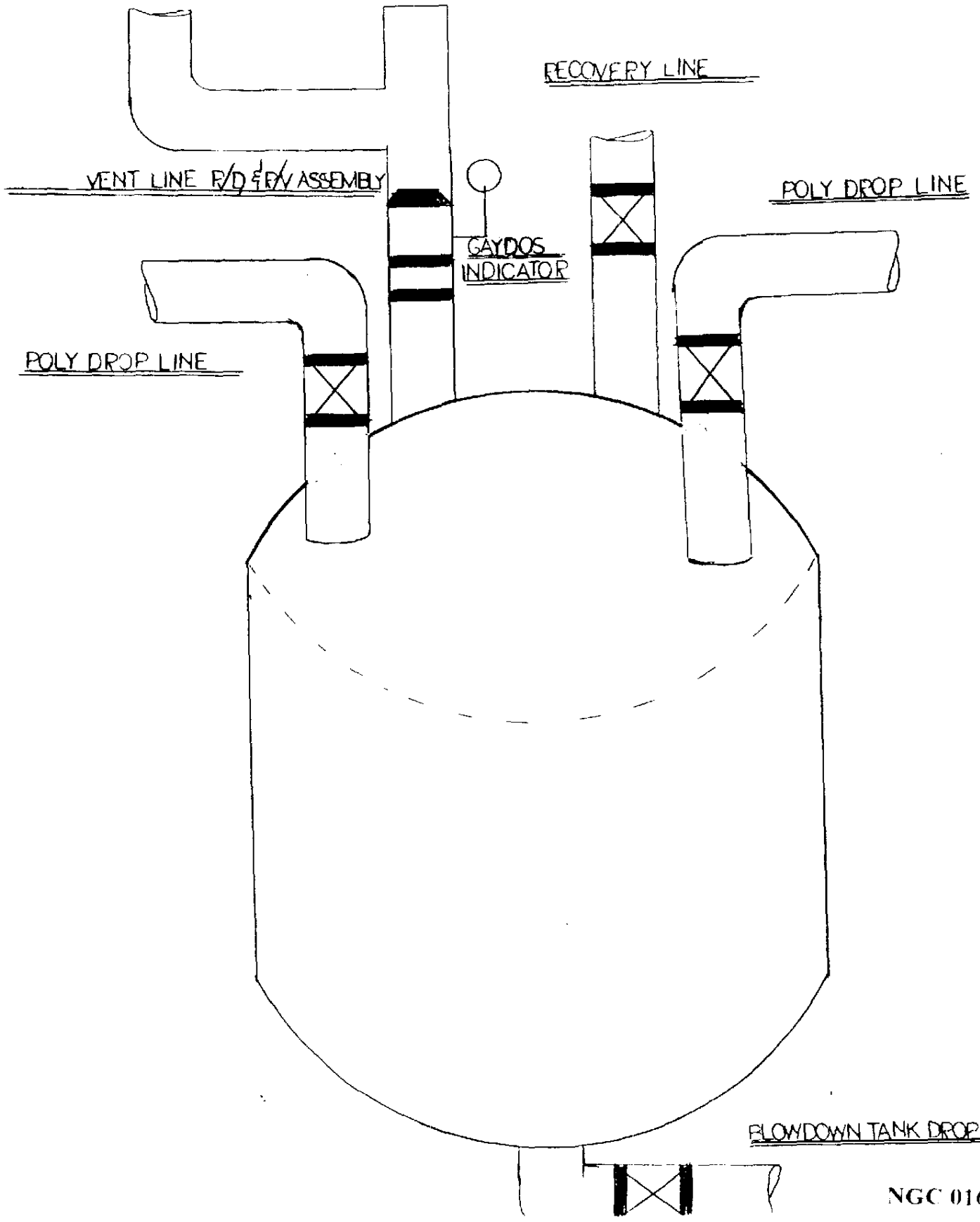

RUPTURE DISCS
FEED
TO 4U COMP
TO 1U COMP
COOLING H&C
WWS STRIPPING COLUMN
BOTTOMS CONTROL VALVE
WWS
HOLDING TANK
HYDROHEATER
COOLING WATER
FILTER
FEED PUMP
STEAM CONTROL VALVE
FEED CONTROL VALVE
FEED
BOTTOMS PUMP
STEAM FEED
TWO-WAY
VALVE
BURP
TANK
SEWER
FILTER
BURP TANK BOTTOMS PUMP

NGC 01640

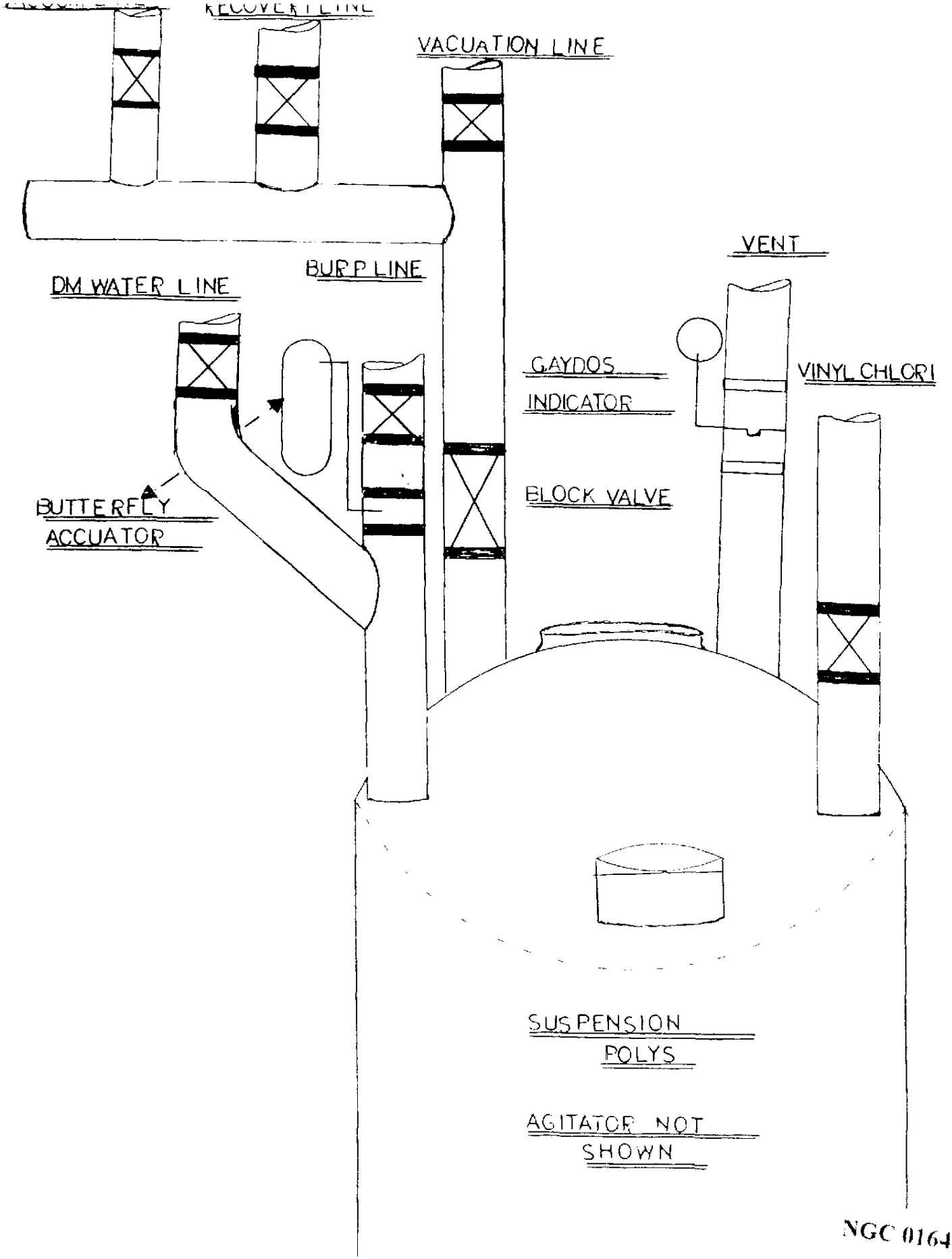

B.F.GOODRICH CHEMICAL CO.
HENRY PLANT
FIRE WATER SYSTEM
EMERGENCY GENERATOR
MAIN SUB
MARSHALL SUB
POLYMERIZATION BLD.
PLANT
FIRE FIGHTING AREA
WAREHOUSE BLDG 732
MACHINE SHOP AND OFFICE 713
WAREHOUSE 713
OFFICE
EVAPORATION BASIN
RC BASIN
PVC BASIN
SYMBOLS
FIRE MAIN
WELL WATER
FIRE HYDRANT
NGC 01641


CONTINUOUS STEAM STRIPPING SYSTEM
TO RECOVERY VCM SYSTEM
FROM BLOW DOWN TANKS
STRIPPING COLM.
H₂O
H₂O CHILLED
COLM. CONDENSER
R/D
SPIRAL HEAT EX.
FEED TANK
STEAM
COLM. SEPARATE
BLEND TANK
BOTTOMS PUMP
TO W.W.S HOLDING TANK
FEED PUMP
NGC 0642

BLOWDOWN TANK



NGC 01643


VACUATION LINE
VENT
BURP LINE
DM WATER LINE
GAYDOS
INDICATOR
VINYL CHLORI
BUTTERFLY
ACCUATOR
BLOCK VALVE
SUSPENSION
POLYS
AGITATOR NOT
SHOWN
NGC 01644

LARRY LOEBACH
GIVE TO BOARD WHEN YOU LEAVE. M. F Heller

B.F.Goodrich INTER-ORGANIZATION CORRESPONDENCE

TO R. J. Grahek — FIELD POINT OR DEPT. & BLDG. NO. — DATE YOUR LETTER

FROM K. J. Willings — FIELD POINT OR DEPT. & BLDG. NO. — DATE THIS LETTER 4/3/87

SUBJECT

SUPERFUND RELEASE REPORTING

All Superfund Reportable Releases are to be reported immediately to the local emergency planning coordinator (Henry Fire Department and Marshall County ESDA). This will be followed up by a written report.

This is a change from past reporting requirements in that the calls are to be made immediately to the outside agency's with the best information available. The following points are to be covered during tl initial call.

1. Identify the Chemical (Use the Attached List)
2. An estimated quantity released
3. Time and duration (estimated) of release
4. Release went to the ground, air, or the river
5. Any known or anticipated acute or chronic health risks associate with the emergency
6. Proper precautions (example: evacuation)
7. Name and telephone of contact at plant to be called.

To help us in reporting, I have attached a list of reportable chemicals, the quantities that when released trigger reporting and a forr for reporting.

Ken Willings

rdm/S118

NGC 01645

PLANT PERSONNEL NUMBERS (HOME NUMBERS)

KEN WILLINGS	(309) 274-4483
MIKE GUYER	(309) 364-3537
DIANA FRIESZ	(309) 246-2148
BOB GRAHEK	(309) 364-3433
ROB CALDER	(309) 364-3307

YOUR NAME: MIKE GUYER

LOCATION OF PLANT: HENRY IL RR#1 BF GOODRICH

CHEMICAL RELEASED: UNSTRIPPED PVC SLURRY CONTAINING VCM

ESTIMATED QUANTITY RELEASED: 500 #

TIME AND DURATION: Date 6/6/87

Time 20:00

How Long 2 MIN. 3" LINE

LOCATION OF RELEASE ✓ VENTED AIR

HENRY, IL _____ SPILLED ON GROUND

MARSHALL COUNTY _____ ON WAY TO RIVER

AREA OF PLANT 731 WIND S SW TO N N
(EXAMPLE: NORTHEAST OF PLANT SITE)

ANY KNOWN OR ANTICIPATED HEALTH EFFECTS: (GET THE MSDS DATA)

PRECAUTIONS: (USE THE MSDS DATA)

ANY INJURIES BEYOND FIRST AID NONE

PLANT CONTACT NAME MIKE GUYER (YOUR NAME)

PHONE NUMBER 309-364-2312 (YOUR PHONE NUMBER)

(TELL THEM HOW LONG YOU WILL BE THERE AND TO CONTACT KEN WILLINGS AFTER THAT TIME)

CALL THE FOLLOWING OUTSIDE PERSONNEL TO REPORT THE INCIDENT: 364-3600

1. HENRY FIRE DEPARTMENT - 364-2341 TIME CALLED 21:15 TALKED TO DALE RYS EPA - DICK FOR MARY ~~KEESEN~~ MR MATHESON
2. ILLINOIS ESDA - (800) 782-7860 TIME CALLED 21:20 TALKED TO _____
3. NATIONAL RESPONSE NUMBER (800) 424-8802 TIME CALLED 21:30 TALKED TO _____
4. NEIGHBORS

W.R. GRACE	(309) 364-2361
MR. BILL STADEL	(309) 364-2274
MR. BILL MILLER	(309) 364-3265

NGC 01646

MY NAME IS Mike Gayer. I AM THE H.R. M
(JOB

_____ AT THE BFGOODRICH COMPANY, HENRY, ILLINOIS PLANT AN
TITLE)

I AM REPORTING A RELEASE OF A REPORTABLE QUANTITY OF A HAZARDOUS MATERIAL.

The BFGoodrich Company

Chemical Group

MANUFACTURING PROCEDURE

WP

PROCESS STEP: Pearl Charge Procedure (Troubleshooting Guide)		
PRODUCT(S)	PLANT: Henry, Illinois	DEPT. NAME/NO.: 5536
PROCEDURE NO.: PCH 12 Section 25-0	DATE: 07/10/87	REFERENCE NO.: PCH-11

TROUBLESHOOTING GUIDE

In any process a number of abnormalities can occur which require immediate action to prevent the situation from becoming more serious. Because of the seriousness of venting Vinyl Chloride to the atmosphere, every precaution must be taken to prevent a release. If a problem in a reactor occurs which is unfamiliar and there is a question about the proper procedure, the charge should be shortstopped and contained in the poly until a Tech Man can be consulted. Since the Blowdown Tank is rated at a lower pressure and has no cooling capacity, an abnormal charge should be contained in the poly until it is under control. Also during normal operation a charge should not be dropped to a Blowdown Tank unless the recovery system is operating properly.

The following procedure outlines the proper steps to control a temperature or pressure rise situation:

A. TEMPERATURE RISE

1. Anytime a temperature rise occurs it should be confirmed that the poly is receiving full cooling water flow to the jacket. If it is not, this should be corrected immediately.

2. Anytime the poly temperature increases 3°F. above the reaction temperature before the last hour of the reaction, the Foreman is to be notified.

3. For reactions which are run to a pressure drop, the temperature may be allowed to rise as long as the pressure is holding steady or dropping.

NGC 01648

REASON FOR ISSUE	ORIGINATED BY	DATE
New Procedure	Procedure Review Team	07/10/87

APPROVALS			
Manufacturing/Production Manager		Area Tech Rep	
General Foreman		Originator	
Safety Engineer		Originator	

PROCESS STEP			
Pearl Charge Procedure (Troubleshooting Guide)			
PRODUCT(S)		PLANT Henry, Illinois	DEPT. NAME/NO. 5536
PROCEDURE NO. PCH 12	Section 25-0	DATE 07/10/87	REFERENCE NO. PCH-11

4. With the exception of Polys 1 & 2, a charge reaching a 10°F. tailpeak in the last hour is to be dropped and recovered early. Charges in Polys 1 & 2, with a 10°F. tailpeak, must be shortstopped with BPA if the pressure is rising with the temperature. Before dropping a charge early, the Downstairs Recovery Operator must be contacted to insure that the Blowdown Tank is empty.

5. Before the last hour of the reaction a small temperature rise may be controlled by opening the quick fill valve full open. If this is done, constant attention must be maintained at the poly to prevent the charge from going hydroful.

6. When the temperature alarm sounds or the temperature rises 10°F. before the last hour of the reaction, the charge should be immediately shortstopped with BPA. If the charge is "killed" the temperature will drop and then the jacket temperature will rise. The charge should not be dropped to the Blowdown Tank until the jacket temperature starts to rise.

7. If the pressure and temperature continues to rise, the charge should be shortstopped with N.O. at 155 psi or at the pressure alarm point. Anytime the pressure alarm is in the abnormal position, the charge must be under constant supervision.

8. If the shortstopping fails to control a charge, it may be set up to equalize to another poly which is on vacuum or is waiting to be charged.

9. As a last resort, a portion of the charge may be dropped to a Blowdown Tank. If this is done the pressure on the Blowdown Tank must be monitored to prevent overpressuring the tank.

10. Anytime a temperature rise occurs the Super Baffle filters must be checked for a restriction.

NGC 01649

REASON FOR ISSUE	ORIGINATED BY	DATE
New Procedure	Procedure Review Team	07/10/87

APPROVALS			
	Manufacturing Production Manager	Area Tech Rep.	L.Z. Mattingly
	General Foreman	Originator	Meridan K Smith
	Safety Engineer	Originator	

PROCESS STEP			
Pearl Charge Procedure (Troubleshooting Guide)			
PRODUCT(S)		Henry, Illinois	DEPT. NAME/NO. 5536
PROCEDURE NO. PCH 12	Section 25-0	DATE 07/10/87	REFERENCE NO. PCH-11

11. Any X500 charge that is shortstopped with BPA or Nitric Oxide must be put to the 1C Blend Tank.

B. PRESSURE RISE

1. A pressure rise may be caused by an agitator failure. This should be the first thing checked when a pressure rise occurs. If the agitator cannot be restarted, the controller should be turned to full cooling and the charge shortstopped through the agitator seal with Nitric Oxide.

2. If a poly goes hydroful during heatup or the first hour of reaction, vent the poly momentarily to the recovery system and shut off the steam sparge. The poly should then be bombed with BPA and handled as a mischarge. When adding the BPA, monitor the pressure closely to insure the poly doesn't go hydroful again.

3. If there is a pressure rise between the 2nd and 4th hour not accompanied by a temperature rise, shut off the quick fill, reduce water flow to the agitator seal to 0.3 gpm, and vent momentarily to the recovery system. If the pressure continues to rise, shortstop the charge and handle as a coarse charge.

NGC 01650

REASON FOR ISSUE	ORIGINATED BY	DATE
New Procedure	Procedure Review Team	07/10/87

APPROVALS			
	Manufacturing/Production Manager: D.L. Rye	Area Tech Rep: K. Gatlin	L.J. Mattingly
	General Foreman: J.P. Griffin	Originator: R. Deuink	R.E. Mendenhall
	Safety Engineer: K.J. Willix	Originator: D. Marshall	C. Fox

TOWER COOLING WATER VALVE OPERATION

Two valve actuators have been installed on the 24" and 22" gate valve located in the pit outside Building 731 office. These actuators will be used to open and close the valves during normal and emergency operations. These actuators are driven by electric motors and the switches for operation are located on a post just West of the pit. These acutators will shut off automatically in the full open and full closed position, this is done by counting the number of revolutions of the valve shaft and as a safety feature the valve will stop when a sufficient amount of torque is seen by the motor.

The actuators will open or close the valves in 3-4 minutes and it takes 177 revolutions of the valves stem to go from full open to full close or vise versa. Due to the location of the valves it is some what difficult to view the rotation of the valve stem. If entry to the cooling water valve pit is needed and entry permit will have to be issued. DO NOT ENTER PIT WITHOUT AN ENTRY PERMIT!

Due to the size of these valves there will be a tremendous amount of force on one side of the gate if you do not have equal pressure on both the tower and chilled water systems. In order to have the valves work, these pressures should be near equal, so the valves will work easily.

The following is a step by step procedure to follow when switching cooling and chilled water valves.

1. Determine the need, do not delay.
2. Have a entry permit issued as soon as you see the need, you will probably need to enter the pit. Set up communication with the upstairs control room to monitor system pressure.
3. If one system is down and one is running you will have to equalize the pressure on both sides of the valve do this by shutting down the system that is running.
4. One man should enter the pit now with one man outside to operate the switches.
5. Activate the switches located below the open and close buttons, push buttons to open or close valves, valve indicator lights are RED OPEN, GREEN CLOSED, and both lights when valve is in travel.
6. Check with man in pit to see if valve stems are rotating.
7. If valve stems are not rotating shut off switches and have the man in the pit operate the valves manually just enough to get the gate off the seats. Once this is done activate the switches again and push open or close buttons.
8. While these valves are actuating, open or close the manual valves on the chilled water system which have hand wheel located on top of the cooling water pit cover. Monitor building cooling water pressure.

9. After 3-4 minutes the actuators will shut off, the valves will be fully open or fully closed, a light is located near the switch, RED is open GREEN is closed.
10. Once the valves are open the cooling pumps can be started, if they were shut down at any time during the switch. Once per week per shift, these valves should be tested, this will give everyone a chance to operate the valves and uncover possible problems which may arise from the valves. To do the test simply open the valve until it is off the seats and then close again. The electrical breakers are located in the Poly Building MCC and these breakers are powered by the Poly Building emergency generator during a power failure. If you have a problem with the valve actuators you will need to notify either an electrician or general maintenance for repairs and adjustments. REMEMBER A VESSEL ENTRY WILL BE NEED DURING PIT ENTRY BY ANY PERSONEL.

COOLING WATER PIT VALVE PROCEDURE

TEST: CONDUCT ONCE PER WEEK PER SHIFT

1. NEED FOREMAN AND BOTH OPERATORS, ONE OPERATOR AT CHILLERS
2. CHILLER VALVES OPEN AND CHILLERS RUNNING NORMAL
3. TOWER VALVES CLOSED SHOULD HAVE GREEN LIGHT AND TOWER PUMPS RUNNING NORMAL
4. TURN ON POWER TO PIT VALVES, SWITCH LOCATED BELOW OPEN AND CLOSE BUTTONS
5. PUSH OPEN BUTTONS ON BOTH PIT VALVES BOTH LIGHTS ON
6. CHECK VALVE TO SEE IF VALVE IS OPENING, IF ENTRY IS NEED TO PIT GET VESSEL ENTRY PERMIT
7. ALLOW VALVES TO FULLY OPEN SHOULD HAVE RED LIGHT
8. PUSH CLOSE BUTTON ON BOTH VALVES BOTH LIGHTS ON
9. WHEN VALVES ARE CLOSED GREEN LIGHT ON SHUT OFF POWER SWITCH
10. NOTE IN LOG ANY PROBLEMS AND WRITE W/O'S FOR REPAIRS

VALVE SWITCHING: SWITCHING FROM TOWER WATER TO CHILLED WATER

1. CHILLER PUMPS ON (2)
2. OPEN CHILLER VALVES AT THE PIT DO NOT OPEN TOWER VALVES YET
3. START CHILLERS AND LINE OUT
4. SWITCH POWER ON TO THE TOWER VALVE ACTUATORS
5. RED LIGHT SHOULD BE LIT PUSH THE CLOSED BUTTON BOTH LIGHTS SHOULD BE LIT
6. CHECK VALVE OPERATION IF ENTRY TO PIT IS NEEDED A VESSEL ENTRY PERMIT IS REQUIRED
7. ALLOW VALVES TO CLOSE THEN SHUT OFF POWER SWITCHES GREEN LIGHT SHOULD BE LIT
8. MONITOR CHILLER OPERATION CLOSELY DURING THIS OPERATION

COOLING WATER PIT VALVE PROCEDURE

SWITCHING VALVES: SWITCHING FROM CHILLED WATER TO TOWER WATER

1. TURN ON POWER SUPPLY SWITCHES LOCATED BELOW OPEN AND CLOSE BUTTONS GREEN LIGHT SHOULD BE LIT

2. PUSH OPEN BUTTON ON BOTH VALVES BOTH RED AND GREEN LIGHTS SHOULD BE LIT

3. CHECK OPERATION OF VALVES IF ENTRY TO PIT IS NEEDED A VESSEL ENTRY PERMIT IS REQUIRED

4. IF THE VALVES ARE NOT ACTUATING THE VALVES WILL NEED TO BE OPENED ENOUGH MANUALLY SO THE ACTUATOR CAN OPERATE THIS CAN BE DONE BY USING THE HAND WHEELS

5. WHEN TOWER VALVES ARE OPEN RED LIGHT LIT SHUT OFF POWER SWITCHES

6. SHUT DOWN CHILLER UNITS

7. CLOSE CHILLER VALVES AT PIT

8. SHUT DOWN ONE (1) CHILLER SERVICE PUMP

9. CHECK OPERATION OF TOWER PUMPS AND START NECESSARY PUMPS

BFGoodrich

Geon Vinyl Division
Specialty Polymers & Chemicals Division
R.R. 1, Box 15
Henry, Illinois 61537
309-364-2311

R.J. Grahek
Plant Manager

December 21, 1987

Illinois Environmental Protection Agency
Division of Air Pollution Control
5415 North University
Peoria, IL 61614

Attention: Mr. Richard Jennings, Regional Manager

SUBJECT: EMERGENCY RELIEF VALVE/RUPTURE DISC DISCHARGE REPORT

Dear Mr. Jennings:

In accordance with the requirements for 40 CFR 61.65 (a) of the National Emission Standard for Vinyl Chloride, the BFGoodrich Company is reporting an emergency relief valve/rupture disc discharge at its Henry, Illinois facility.

Should you have any questions concerning this report, please contact Mr. Kenneth J. Willings, of my staff, at (309)364-2311, extension 214.

Sincerely,

THE BFGOODRICH COMPANY
Geon Vinyl Division

Robert J. Grahek,
Plant Manager

ENV1:sfm

cc: Chris Romaine

NGC 01655

THE BFGOODRICH COMPANY
HENRY, ILLINOIS

VINYL CHLORIDE RELEASE REPORT
(40 CFR 61.65 (a))

Type of Release:	Rupture Disc/Relief Valves
Day/Time of Release:	Tuesday, December 15, 1987; 0745 - 0755 hours
Quantity of Vinyl Chloride Released:	25,440 lbs. (See attached calculations)
Source/Nature:	Emergency relief pressure in Polymerizer No. 3 Polymerizer No. 4 Polymerizer No. 15 Stripping Column No. 1 Stripping Column No. 2, and Blowdown Tank No. 10 Manually Venting.

NGC 01656

Emergency Discharge Chronology of Events:

1) On Tuesday, December 15, 1987 at approximately 06:50 hours, power provided to the plant from CILCO, the local Utility Company, failed during snow/ice storm. This failure also resulted in steam and cooling water loss.

2) BFGoodrich personnel preparing for shift change were held over. This enabled the Polymerization Building to have a larger than normal personnel staff to try to combat the emergency situation.

3) Immediately the plant personnel implemented the electrical power outage procedure.

4) Operating personnel immediately started to shortstop the reaction occurring in the polymerizers. Without agitation, complete mixing of the shortstop reagent with unreacted vinyl chloride monomer is ineffective. Thus, the charge will continue converging and thereby increasing pressure and temperature when no cooling water is available.

5) The emergency power generator that supplies agitation to the polymerizers, building floor lights, and building exhaust, failed to start.

6) The operating personnel used empty, available polymerizers and the available Recovery System as an attempt to lower and equalize pressures from the reacting polymerizers.

7) Portions of the reacting polymerizers were dropped to blow-down tanks (holding tanks) to help control pressures.

8) At approximately 07:45 - 07:55 hours Poly #3, 4, and 16 rupture discs relieved.

9) At approximately 07:50 hours columns #1 and #2 safety relief devices relieved.

10) To control the pressure build-up in the recovery system and to prevent the loss of entire contents of the remaining reactors, seven polymerizers were manually vented. The venting relieved pressure from the system and enhanced the chances of the shortstop to react with the vinyl chloride monomer.

11) At approximately 07:50 hours blowdown tank #10 safety relief device relieved.

12) At approximately 08:40 hours the emergency generator was started, but it failed to engage in the electrical system.

13) Power was restored to the plant at approximately 16:20 hours through one of the two supply legs. Alternative back-up power was restored to the second leg at approximately 05:00 hours on December 16, 1987.

ENV2:sfm

BFGoodrich has taken the following steps prior to discharge to prevent occurrences:

1) Operators and area supervisors responsible for the operation of the equipment have been trained with respect to procedural steps for controlling releases and emergency conditions.

2) Relief valves are removed and pressure checked as a part of a preventative maintenance program.

3) Rupture discs are replaced after a specific length of service to protect their integrity.

4) The emergency back-up generator which operates critical equipment (i.e., poly agitation, building floor lights, and building exhaust) is checked and started on a weekly basis, put under load on an annual basis, and is placed on an active PM program. The emergency back-up generator which operates critical equipment in the polymerization building carried the load with no malfunctions on November 20, 1987 when power was discontinued in order to make an electrical tie-in.

5) A shortstop system is in place and inspected on a routine basis for empty cylinders, plugged hoses, and a sufficient back-up supply of shortstop reagent.

6) The plant's electrical power is provided by CILCO from two supply loops, a main leg and an alternate secondary back-up leg. Both are checked periodically by CILCO to insure their operational quality.

Cause of Discharge:

1) The incident, upon further review, was caused by the loss of electrical power to CILCO's Marshall Substation which feeds the BFGoodrich Plant and the inability to engage the emergency back-up diesel generator which provides poly agitation.

2) It was later found, upon investigation, that the reason for the generator not to engage was a faulty battery lead caused by a loose battery clamp. A blown Field exciter fuse resulting from the effort to jump start the generator during the power failure prevented the generator from engaging after it was started.

3) The failure to deliver electrical power to the poly agitators and the loss of cooling water due to the plant power outage caused high pressure on the polymerizer as well as on the recovery system.

BFGoodrich will initiate the following actions to prevent recurrence:

1) BFGoodrich has taken steps to initiate a meeting with a CILCO representative to reiterate the importance of immediate notification of any power supply malfunctions.

2) A check list will be constructed and performed when testing of emergency back-up diesel generator is done on a weekly basis.

3) Technical personnel will review and revise shutdown procedures in the recovery area of the polymerization process.

4) Battery leads on emergency back-up diesel generator will be replaced.

5) We will investigate the possibility to use a gasoline power "pony engine" as the starting supply power to emergency back-up diesel generator instead of two 12-volt batteries.

6) R&D will investigate possible alternative shortstop which will perform better when no agitation conditions exists than present type available.

Method used in determing the amount of vinyl chloride monomer released from polymerizers rupture disc assembly:

POLY NUMBER 3

1) Vinyl Chloride Monomer Charged = 12,600 pounds

2) At this point in the reaction the charge had initiated to 50% conversion; therefore, 50% of the release is vinyl chloride monomer.

3) Pounds of Vinyl Chloride Monomer Released:

(12,600 lbs)(.50) = 6,300 lbs

POLY NUMBER 4

1) Vinyl Chloride Monomer charged = 12,600 pounds

2) At this point in the reaction the charge had initiated to 35% conversion; therefore, 65% of the release is vinyl chloride monomer

3) Pounds of Vinyl Chloride Monomer Released:

(12,600 lbs)(.65) = 8,190 lbs

POLY NUMBER 16

1) Vinyl Chloride Monomer Charged = 8,500

2) At this point in the reaction the charge had initiated to 60% conversion; therefore, 40% of the release is vinyl chloride monomer

3) Pounds of Vinyl Chloride Monomer Released:

(8,500 lbs)(.40) = 3,400 lbs

Method used to determine the amount of vinyl chloride released from stripping column number 1 and stripping column number 2 safety relief device:

Assumption:

1) Approximate duration of release for stripping column #1; 30 seconds

2) Approximate duration of release for stripping column #2; 1 minute

3) Vessel pressure in psig = 55 psig

4) Vapor temperature - 220 degrees F = 680 degrees R

5) Orifice area = 18.60 square inches

Equation used:

$$W = (C)(.851)(A)(P1)\left(\frac{M}{ZTa}\right) BVf$$

Note: BVf = 1.0

$$W = (300)(.851)(18.60)(70)\left(\frac{62.5}{(.88)(680)}\right) 1.0$$

W = 107,425 lb/hr

For a 1.5 minute release:

$$(107.425 \text{ lb/hr})\left(\frac{1 \text{ hr}}{60 \text{ min}}\right)(1.5 \text{ min}) = 2{,}686 \text{ pounds of vinyl chloride}$$

Method for determining VCl discharge from blowdown tank number 10 safety relief device:

Assumption:

1) Approximate duration of release - 1 minute

2) Vapor temperature = 180 degrees F. = 640 degrees R

3) Vessel pressure in psig = 175 psig

4) Vinyl Chloride Molecular Weight = 62.5

5) Orifice area = 2.138 square inches

Equation used:

$$W = (C)(.851)(A)(P1)\left(\frac{M}{ZTa}\right) BVf$$ where:

C = ASME nozzle gas constant
A = Orifice area in square inches
P1= System pressure = gauge pressure plus atmospheric pressure
M = Molecular weight of vinyl chloride
Z = Compressibility factor
Ta= System temperature
B = Vapor correction factor for constant back pressure above critical pressure
Vf= Vapor correction factor applies to bellow valves
W = Vapor mass flow

Note: For non-bellows with constant back pressure apply "B" and Vf = 1.0

$$W = (316)(.851)(2.138)(190)\left(\frac{62.5}{(.75)(640)}\right)(1.0)$$

W = 39,418 lbs/hr

For 1.0 minutes release:

$$(39,418 \text{ lbs/hr})\left(\frac{1 \text{ hr}}{60 \text{ min}}\right)(1 \text{ min}) =$$

Pounds of Vinyl Chloride released = 657 pounds